

APPROVED FOR USE:

*[Signature]*  
Manager, Surface Water

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ADMIN RECORD

## 1. PURPOSE

The purpose of this procedure is to establish protocols for the processing of surface water samples collected with automatic samplers during snowmelt runoff, storm runoff, and pond discharge events at stream gaging stations at the Rocky Flats Environmental Technology Site (RFETS).

## 2. SCOPE

These procedures apply to all personnel performing sampling as part of the event-related surface water monitoring program at RFETS. Physical and water quality variables included in this program are described in the *Rocky Flats Environmental Technology Site Automated Surface Water Monitoring FY98 Work Plan* (RMRS 1998a). Procedures for the operation of the automatic samplers are described in *Operation and Maintenance of Stream-Gaging and Sampling Stations* (RMRS 1998b).

## 3. REFERENCES

The following are references reviewed prior to the writing of this procedure:

Isco, Inc. 1984. *Instruction Manual for Model 2700 Portable Sampler*.

Isco, Inc. 1990b. *Instruction Manual for Model 3700 Portable Sampler*.

Isco, Inc. 1990a. *Instruction Manual for Model 3700R/3740 Refrigerated Sampler*.

Isco, Inc. 1994. *Instruction Manual for Model 3710 Portable Sampler*.

### 3.1 Internal References

Kaser-Hill, 1997. *Rocky Flats Environmental Technology Site Integrated Monitoring Plan - FY97*, Golden, Colorado, December.

RMRS 1998a, *Rocky Flats Environmental Technology Site Automated Surface-Water Monitoring FY98 Work Plan*. Revision 0. October, 1998.

RMRS 1998b, *Operation and Maintenance of Stream-Gaging and Sampling Stations*, RMRS/OPS-PRO.084. September 15, 1998

#### **4. LIMITATIONS AND PRECAUTIONS**

Sampling crews will be responsible for collecting and labeling of samples, as well as preparing and maintaining automatic samplers and flow meters for the next sampling event.

#### **5. PREREQUISITES**

Personnel executing the protocols described in this procedure should be instructed in the operation of the automatic samplers and flow-measurement equipment used at the gaging stations. At least one person on the field crew shall have two (2) years of field experience sampling either surface water or ground water. All field personnel shall have satisfied Occupational Safety and Health Administration (OSHA) training requirements for work at hazardous waste sites (40 CFR 1910.120).

Each sampling crew will be required to obtain (at a minimum) the following equipment prior to sampling:

- Sample containers/bottles
- Replacement gaging
- Black or blue waterproof pen
- Field Activity Daily Log book
- Field data transfer equipment (laptop computer)

#### **6. INSTRUCTIONS**

**Note:** The following equipment is present at each gaging station included in the event-related surface water monitor program:

One of:

- Isco Model 2700 Portable Sampler
- Isco Model 3700 Portable Sampler
- Isco Model 3700R Refrigerated Sampler
- Isco Model 3710 Portable Sampler

One of:

- Isco Model 3220 Flow Meter
- Isco Model 3230 Flow Meter
- Isco Model 4220 Flow Meter
- Isco Model 4230 Flow Meter

## **6.1 Removal of Composite or Sequential Sample Containers from Automatic Samplers**

- a. Upon arrival at the gaging station, unlock the instrument enclosure and open to expose the automatic sampling equipment.
- b. Open the sampler to expose the keypad interface.
- c. Remove the composite sample container or rack of sequential sample containers. The rack of sequential bottles should be removed from the Isco 3700R Refrigerated Sampler by lifting the front edge of the rack to disengage it from the two ramps, and pulling it straight out of the refrigerator. Care must be taken not to catch the rack on the distributor arm. Bottles in the Isco Model 2700, 3700, 3710 samplers are directly accessible once the top and center sections of the sampler have been removed. In both cases, at the sampling crew's discretion, caps can be placed on bottles to prevent spillage during handling.

## **6.2 Compositing of Multiple Sample Bottles**

**Note:** When samplers are operated with a single sample bottle (not in sequential sampling mode), both time- and flow-paced composite samples may be generated in a single sample bottle, requiring no field compositing. This section only applies to use of samplers in sequential mode, when compositing is required.

When the automatic sampler has collected samples in the sequential mode (using sequential sample containers), the samples that were collected during the event being studied may be combined to yield a representative composite sample. Two types of composite samples may be generated from multiple bottles collected in the sequential sampling mode.

**Note:** Equal-volume composite samples may be generated by combining an equal volume of water from each of the sample containers that were filled during the event

being sampled. Samples should be combined with an effort made to maximize total sample volume. This will be accomplished by using the entire volume of the sequential sample containing the lowest liquid level and using equal volumes from each of the other sample bottles.

- a. Sequential samples should be capped and gently shaken immediately prior to compositing to resuspend any solids that may have settled to the bottom of the container.
- b. Measure an equal volume of each sequential sample to be combined in a 1-liter glass graduated cylinder and pour this aliquot into the composite container. A glass composite container should be used for organic samples and a polyethylene or teflon composite container for metal or radionuclide samples.
- c. Rinse the cylinder with distilled water between measurement of each sequential sample. Care must be taken to drain the cylinder as completely as possible after each rinse to avoid dilution of the sample. Rinsate from this procedure should be handled as described in SOP FO.07, *Handling of Decontamination Water and Wash Water* (EG&G 1991c).

**Note:** Flow-weighted composite samples will be generated by combining volumes of water from each of the sample containers proportional to the flow rate at the time each sample container was filled. Samples should be combined with an effort made to maximize the total sample volume. This will be accomplished by using the entire volume of the sample collected at the highest flow rate and using proportional volumes of sample from preceding and following bottles. For any given sampling time, the ratio of the flow rate at that time, to the maximum flow rate during the sampling period, multiplied by the volume of the sample collected at the maximum flow rate, will give the flow-weighted volume for that sampling time to be used in the composite sample.

- d. Remove strip-chart from flow meter or interrogate flow meter using laptop computer to obtain a table of level or flow rate data versus time.
- e. Using the level or flow data obtained in 7.2. (d), determine the maximum water level or flow rate at which a sample was collected during the sampling period.
- f. For each sequential sample, calculate the ratio of the water level or flow rate at the time that the sample was collected to the maximum water level or flow rate.

- g. For each sequential sample, multiply the ratio calculated in step 7.2. (f), by the volume of sample collected at the maximum water level or flow rate. This will give the flow-weighted volume for each sample.
- h. Sequential samples should be capped and gently shaken immediately prior to compositing to resuspend any solids that may have settled to the bottom of the container.
- i. Using the flow-weighted volumes calculated in step 7.2. (g), measure an aliquot from each sequential sample to combine in a 1-liter glass graduated cylinder and pour this aliquot into the composite container. A glass composite container should be used for organic samples and a polyethylene or teflon composite container for metal or radionuclide samples.
- j. Rinse the cylinder with distilled water between measurement of each sequential sample. Care must be taken to drain the cylinder as completely as possible after each rinse to avoid dilution of the sample. Rinsate from this procedure should be handled as described in SOP FO.07, *Handling of Decontamination Water and Wash Water* (EG&G 1991c).

### 6.3 Preparation of Automatic Samplers and Flow Meters for Subsequent Sampling Events

When the collection of surface-water samples for a single event is complete, the sampling crew should prepare the gaging station for the next sampling event. Applicable work plans or technical design documents should be consulted for information on types of analytes to be sampled and whether the sampler should be set in the composite or sequential sampling mode.

- a. Place clean composite or sequential containers in the Isco automatic sampler. When using composite sample bottles, the pump tubing should be inserted through the hole in the bottle lid. When changing from the sequential mode to the composite sample mode or vice versa, the distributor arm assembly in the sampler must be changed accordingly. Consult the Instruction Manuals for the Isco Model 2700 (Isco 1984), (Isco 1990b), 3700R (Isco 1990a) and 3720 (Isco 1994) samplers for correct procedures for all facets of automatic sampler use and programming.
- b. Program the automatic sampler for the next event. Consult the applicable workplan, and the Instruction Manuals for Isco Model 2700 (Isco 1984), Isco 3700 (Isco 1990b).

Isco 3700R (Isco 1990a), and Isco 3710 (Isco 1994) Samplers for correct procedures for all facets of automatic sampler use and programming.

#### **6.4 Decontamination of Automatic Sampling Equipment**

- a. Decontaminate all sequential and composite sample containers and prepare for reuse after they have been used during a sampling event. Procedures for proper cleaning of these containers are detailed in SOP FO.03, *General Equipment Decontamination*, Section 5.4 (EG&G 1991c).
- b. Containerize and dispose of all water used during decontamination in accordance with SOP FO.07, *Handling of Decontamination Water and Wash Water* (EG&G, 1991c).
- c. During normal sampling operations, the automatic sampler itself should not require cleaning. Cleaning should be performed as a quarterly maintenance activity as needed. More frequent cleaning of the automatic samplers may be performed at the discretion of the field crew if the interior or exterior surfaces of the sampler appear soiled or dusty. When cleaning of the sampler is necessary, procedures outlined in *Operation and Maintenance of Stream Gaging and Sampling Stations* (RMRS 1998b) should be followed. Decontamination water from this procedure should be handled as described in SOP FO.07, *Handling of Decontamination Water and Wash Water* (EG&G 1991c).
- d. At continuous, flow-paced sampling locations, sample intake tubing is automatically rinsed with surface water immediately prior to the pulling of each composite grab. Due to the time interval required for the automated samplers to perform this rinse, it is not practical to perform such rinses at event-related, stormwater sampling locations.

### **7. DOCUMENTATION**

#### **7.1 Records**

Field crews should record summary information of daily activities in the Field Activity Daily Log. The Field Activity Daily Log narrative should create a chronological record of the sampling crew's activities, including the date and time each site is visited. Descriptions of sampling activities at each station, problems encountered, and deviations

from this procedure shall also be included. Log entries may include, but are not limited to the following information:

- Date and time of each entry or activity
- Names of sampling crew
- Gaging station ID
- Mode of automatic sampler (composite or sequential) upon both arrival and departure
- Method of sampling (sequential, equal-volume composite, or flow-weighted composite)
- Date and time sampling program started (first sample)
- Date and time sampling program ended (last sample)
- Number of samples collected
- Time interval between samples
- Amount of sample in bottle
- Stage at which sampling initiated
- Type of event sampled
- Weather conditions
- Comments and observations

## **7.2 Authentication**

Authentication of the completion of this procedure is documented by signing the last page of the Field Activity Daily Log entry for each day.